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35

On the remote causes of disease from insensible matters in the air

V They are 1st by exhalations from the human body in a living state, rendered morbid by previous disease, or by confinement to the body. They have been called by Dr Miller "Idiomiasmatic" exhalations from their being derived

We come now to mention the effects of the insensible qualities of the air upon health and life, ~~or~~ and of air impregnated with certain foreign or extraneous matters which are obvious to our senses.

These are 1st: what are commonly called marsh ~~and human~~, ~~or~~ exhalations. They ~~former~~ are derived from dead and putrid animal and vegetable matters – ~~the former~~ latter ~~are derived from the human body in a living but morbid state~~. Dr Miller of New York has distinguished them ~~the former~~ ~~them~~ by the name of "Koinomiasmata" – which he applies to exhalations from ~~to~~ matters in the latter matter public, or exposed places. – ~~and this name of~~ ~~miasmata which he applies to exhalations~~

V 3.ly The matter which produces the Influenza.

4.ly Certain matters, which are generated by secretion in the human body, and propagated from one person to another through the medium of the air. These are known by the name of Contagions.

X 1.o Stagnated Air.

from private or personal sources. They extend to living dumb animals as well as to the human species. —

5 ~~1~~ 2 Certain matters which ~~float in the air which~~ are discharged from the lungs in Respiration. ~~are known by the name of Contagions. These~~ are the Small pox, ~~Measles~~, Influenza, the ~~Hooping cough & perhaps some others.~~ —

6 ~~2 Carbonic acid gas.~~ a Certain matter discharged from Charcoal, Calcarious substances & fermenting liquors called Carbonic gas.

7 ~~6~~ Hydrogen gas. ~~8~~ Harmattan winds. ~~9~~ a Matter discharged from the earth by earthquakes. ~~10~~ a Vapor from springs ~~11~~ Sulphuric acid in a gaseous form.

12 ~~10~~ the Air of a stove room. ~~13~~ The effluvia of certain manufactories ~~14~~ Certain odors from flowers & spices. ~~15~~ particles of Sand ~~16~~ the Matter of ch: forms the inflammatory constitution of the Atmosphere, upon each of which I shall make a few remarks in the order in which they have been mentioned.

1 The Miasmatic exhalations. The most fruitful source of these exhalations is from low and marshy grounds. Three circumstances are necessary to produce them, viz: 1st dead vegetable or animal matters, or a compound of each of them 2nd heat, & 3d & 4th moisture. Heat is most effectual for the purpose of promoting putrefaction when it is at or a little above 80°: and when it acts upon bodies predisposed to it for sometime. To show that heat is essential to the production of morbid miasmata, I shall mention the following facts. Many years ago the meadows below ~~near~~ this city were overflowed by the Delaware in the month of April, and many animals ~~and vegetable substances~~ were left on the

meadows exposed to the air after the rise of the river. In vain was sickness looked for after it, for as yet there was not heat enough to putify ~~the dead animals~~ the dead animals, nor to exhale them in the air, nor was there at that time any quantity of vegetable matter upon the ground to putify and mix with the ~~dead~~ animal matter. Some years afterwards a similar fresh occurred in the river and the meadows were ~~completely~~ again overflowed in the month of May or June. From the feble-ness ~~and that duration of~~ of the heat of that time, ~~and from its having acted upon it~~ I guided by the event of the inundation in April before mentioned, I ventured to predict that no

V The truth of this remark is so well established in Holland that they sometimes check their bilious fevers by completely overflowing the moist grounds from which ~~they~~ the exhalations that produce them originate. This was done Sir Jno Pringle says at Buda, and with the happiest effects.

extraordinary Sickness would follow, and the issue was agreeable to this Opinion. many facts show that moisture is essential to the production of marsh miasmata. The Sun exhales nothing unwholsome from the dry ground, ~~for~~ nor from marshes when they are completely covered with water. Mr Bruce remarks this in his travels that rainy seasons which perfectly covered the low grounds of one of the Countries he visited ~~and~~ were always healthy. The same thing is noticed by Dr Dazilles in his account of the diseases of the Negroes at Cayenne. A rainy season is ~~you~~ seldom sickly in the low Counties of the State of Delaware,

~~and~~ but ~~it~~ is often so in the high and hilly parts of Pennsylvania where the rain is retained in quantities sufficient only to create moisture, but ~~not~~ not liquidity, that is, not completely to cover the ground. This was remarkably the case in the ~~the~~ years 1804, and 1806.

It has often been remarked that ~~when~~ the ~~the marshy ground~~ exhalations from marshy ground ~~that~~ ~~are moistened~~ have been overflowed with a mixture of salt and fresh water are more apt to produce fevers of a violent nature than ground ~~moistened~~ overflowed only with fresh water. This has lately been noticed by Dr Hamilton in his history of the bilious fever which prevailed some years ago ~~between the~~ at Lyme Regis in England.

Dr Lind remarks that the Sickness is indeed only by the first fall of the Rain, and supposes these first Showers bring with them miasmata which had been previously ~~and~~ exhaled and had floated in the air with the Vapor which constitutes the rain. perhaps ~~they act~~ the rain acts ~~as~~ by opening the earth, so as to permit it to exhale confined noxious matters. a great than Dr Huxham supposes once had that effect in producing a fever in the neighbourhood of Plymouth in Great Britain.

I have said that heavy rains that com=
=pletely cover the ground, prevent exhala=
=tion, but I have mentioned a case in the
4th volume of my inquiries in which
a heavy rain promoted exhalation, which
became the cause of a bilious fever. The
rain in this instance destroyed the
green covering which had covered a pond
of stagnating water, and thus permitted
the confined miasmata to escape into the
atmosphere. We read of fevers being induced
by heavy rains on the West Coast of Africa.
Perhaps they act in the same manner;

I have said likewise that marshy grounds & low when
completely dry, do not produce fevers. To this there
are some seeming exceptions. Sir John

This fact was so notorious that the inhabitants predicted a sickly or healthy season from the different depths of the water below the surface of the earth.

Pringle describes a fever which prevailed at Brabant in the British Army at a time when the surface of the earth in that country ~~did not pass~~ was uniformly dry, and no source appeared from whence exhalations could be derived, but his Johns adds, that ~~the~~ below the surface of the earth about two feet some inches, there was a bed of water a part of which he supposes was exhaled thro' the earth impregnated with putrid matter, and that the fever was produced by them. A Dr Gordon who practised medicine at Berbice for several years informed me that a fatal epidemic ~~after a dry season of 10 months from~~ yellow fever prevailed in that Country, ~~in the~~ ~~the~~ between July 1804 & May 1805 in which 500 persons ~~year~~ died after a season in which but ~~three~~ inches of water fell in 10 months

Those exhalations have been called the "breath of the earth" to distinguish them from exhalations from the surface of the earth. There is ~~a time~~ are more ~~fevers which~~ relative by Sense in which a bilious fever was observed to prevail where no obvious Source of exhalation existed. The fever in this case followed a high Wind which elevated a quantity of putrid matters from the bottom of a lake and afterwards diffused them through the atmosphere. -

It owe their offensive odor, but they Sometimes exist in a deleterious form without being perceived by the Sense of Smelling.

Marsh miasmata are most noxious in the mornings and evenings. They are least so in the middle of the day, and the middle of the night. In the former they are elevated above being inspired by the lungs - in the latter they are precipitated to the earth by the coolness of the midnight Air.

The young and the robust are most

From the accounts I have heard of the low & flat nature of that province, I think it highly probable that a bed of water below the surface of the earth nourished the exha-
-lations which produced that fatal epidemic.
It is probably from fissures made in the earth by great droughts and exhalations from the sea that they are often followed by ~~[illegible]~~ epidemic diseases. ~~[illegible]~~
It is essential to the production of fevers from marsh exhalations that ~~they~~ the matters which furnish them should be in a state of putrefaction. To this they

There have been disputes about the extent to which these exhalations may be carried, and still retain their power of inducing disease. It is clearly proved by Lempriere in his account of the diseases of Jamaica, that they communicate fevers to a distance of nine miles where no obstacles interpose to obstruct their passage. They travel in

liable to be affected by them. Men are likewise affected by them than Women.

From the account I formerly gave of the Odor of the Sweet scented Shrub passing 120 miles ~~along~~ upon the ocean; it is probable Miasmata might be conveyed to the same or a greater distance, provided there were no ~~matter~~ woods, hills, or houses to obstruct them.

the course of the Winds. This was observed in this city in the years 1793 & 1805.

There have disputes likewise as to the time in which miasmata remain in the body before they induce disease. They seldom act without the concurrence of an exciting cause - and this has been observed to bring on disease from within a few hours after the miasmata have been received into the body, to 20 and 30 days, and ~~but~~ according to Dr Jackson ~~two~~ six months. The sporadic cases of yellow fever which occur in all our cities in the Winter and Spring appear to be derived from the miasmata of the preceding Summer still floating in the body; but if it be denied that miasmata do not exist thus long in the body in a state capable

of bringing on a fever, they may become the Cause of it in another way that is they may leave a predisposition to that state of fever ~~upon~~ in the System after having passed out of it. The Soldiers of the Royal fencible British Regiment after their return from Egypt were affected with Opthalmia on their march to Scotland. The relator of the fact ascribes it to Contagion lurking in the Cloaths of the Soldiers, but it seems to have arisen from some exciting Cause acting on the predis-position induced in the eyes by the remote causes of Opthalmia in Egypt. The Rev.d Mr Reed a member of Congress from Massa-chusetts informed me in the year 1799, that the Soldiers who returned from Ticonderoga where bilious fevers were common during the revolutionary War, to the Village in

An intelligent Grazier near Derby informed me that the new comers from Ireland who work in the meadows on the Derwent below this city, often escape the bilious fever the first year after their arrival, but scarcely ever escape it on the second.

which he resided, enjoyed good health the first Autumn after they came home, but that they were ~~of~~ all affected with a remitting fever the Autumn afterwards. — That this fever was derived either from miasmata still existing in their bodies, or from a predisposition to fever left by their peculiar stimulus was evident from no person in the Village but the Soldiers being affected with it.

The Chemists have in vain endeavoured to discover the nature ~~of the~~ & Composition of the marsh exhalations. The Endiometer teaches us nothing respecting them. They are upon a footing with the Contagion of the Small pox & measles, and with the Odors ~~which~~ that float in the Air which sicken, or

evine us, but which elude the finest tests which ~~chemistry has applied to discover~~ have been applied by Chemistry to discover them. —

The ~~miasmata~~ Miasmata or marsh or koiro act most certainly in the body in moist and cool weather. This was long ago observed in the asiatic and African plague, and has been frequently observed in the yellow fever of this Country. —

Habit contributes very ~~much~~ much to lessen the morbid effects of those miasmata upon the system. Dr Clark tells us that the same miasmata which produce bilious fevers, Colics, Coleras and Spasmodic diseases upon new Comers, produce only a puking of bile in a sickly season in the old inhabitants of Matras, and all writers

V The effects of habit are still more obvious in the old inhabitants of countries subject to these exhalations. They become in time one of the stimuli of life, and hence we observe old people ~~who~~ to sicken and die when they migrate from this influence to a healthier country.

~~VI a more malignant type in a dry than in a moist air. The fevers in the latter state of the air are generally of a Remittents & Intermittents.~~ —

tells us that the miasmata which produce a yellow fever in a new Country in the West Indies, produce only a mild remittent or a less acute disease in the natives & old Settlers of the Islands. Rainy

The forms of disease produced by miasmata are much varied by Climate & Season. They are most malignant in ~~hot~~ Countries ~~warm~~ in which heat is not alternated with Cold. They are most ~~open~~ inflammatory in Countries ~~the~~ of a re=verse Character. Fevers are more disposed to a Continual, ~~form~~ in the former, and to an intermitting form in the latter Countries. ~~They further upon~~ IA

Let us now attend to the manner in which they act upon the body.

been supposed they induce disease in the stomach by acting directly upon it. I shall say presently they act in a different manner ~~I would dispose to doubt this opinion. I have~~ rather

purpose by being taken in the stomach in a moderate quantity, they would protect the system from the fever by their gentle and inoffensive ~~stimu~~ stimulus. ~~I~~ Swallowing a few spoonsfull of Rum will prevent intoxication from the smell of it, and eating onions we know prevents even our smelling them. ~~——~~ Carbonic gas so fatal ~~to the~~ when taken into the lungs, is a ~~Cordial~~ cordial medicine in the stomach. Why may not miasmata act in the same way? ~~Than indeed~~

1 ~~Upon~~ In the Arterial System they produce the following forms of fever. Viz

1 The yellow fever, and the first grade of the plague.
2 The Inflammatory bilious fever, & the 2nd grade of the plague
3 The mild Remittent, & the 3rd grade of the plague.
These three grades of the plague are distinctly described by ~~Dig~~ Hennell late writers.
4 The Intermitting fever
5 The chronic fever & the
6 Hebdomada.

2 ~~Upon~~ In the Stomach they induce Sickness & vomiting, and inflammation. When they affect the Stomach in this manner, the disease has been called by the French physicians "a gastritic fever". It has

3 In the bowels they produce, Dysentery Colera morbus - Colic and Diarrhoea. These have been called the Intestinal fluxes of fever.

4 In the Liver they produce inflammation,

v This is so common, that we are told the old Romans seldom bought, or cultivated a farm till they had examined whether the situation of it were healthy, by first in==specting the livers of the Domestic animals in its neighbourhood.

suppuration, obstruction - defect of secretion & excretion and preternatural secretion and excretion of bile. They likewise change the color, and vitiate the qualities of the bile, so as to dispose it to give pain in passing out of the body by its acrimony. These morbid effects of miasmata upon the liver are not confined to the human species. The livers of domestic animals that feed upon marshy grounds, or live in their neighbourhood are affected nearly in the same way, particularly with in=
=flammation and ulcers. ✓

5 In the Spleen they produce great congestion - enlargement - and sometimes ~~to~~ complete disorganization. This has been proved by many dissections by Cleghorn, Pringle & Jackson. —

9 In the throat & mouth they sometimes produce sores & ulcers. Mr Webster ascribes the Cynanche Maligna to the influence of Koinomiasmata upon the System determined to those parts by the circumstances of the sensible qualities of the air or of the constitution.

6 In the kidneys ~~& bad~~ lungs ~~& bronchia~~ they sometimes produce inflammation, and obstructions. —

7 In the ~~bowels~~ muscles - nerves - brain and mind, they produce Convulsions - hys= - terical and hypocondriacal Symptoms - pain - inflammation - coma - palsy - apoplexy & madness in the order in which those parts of the body and the respective dis= = eases have been mentioned.

8 In the Lymphatic & glandular System they produce ~~gla~~ dropsies and glandular Swellings. ✓

9 upon the Skin they produce prickly heat, ~~e~~ spere - erysipelas - boils - carbuncles - & petechial Spots. In many instances they produce Chronic eruptions. The Leprosy ~~in~~ formerly was derived from them

in several of the marshy countries of Europe. Travellers tell us there are two villages in the neighbourhood of Constantinople which have never been visited by the plague. The inhabitants of those villages are covered with eruptions upon their Skin which are probably nothing but an external form of this plague. The dark and even black color of the Skins of the Africans is supposed to arise in part from the ~~black~~ same color of the bile induced by Miasmata, and afterwards diffused through the System.

10. Besides all the ~~varied affections~~ diseases which have been mentioned, they produce many local affections - such as opthalmia - pains in the head, jaws - ears - hips & back. The opthalmia of Egypt is evidently

induced by the same exhalations which produce the plague. —

I have hitherto spoken only of those exhalations which are derived from low and marshy grounds. They are the most general sources of ~~dis~~ the diseases I have enumerated. But there are many other sources of putrid exhalations which possess exactly the same properties, and which produce though in a limited manner exactly the same effects. I shall barely mention them, & refer you to the 4th volume of my medical Inquiries for a more particular history of them. They are the following matters in a state of putrefaction 2 Cabbage. 3 Potatoes, 4 pepper, 5 Indian meal. 6 Onions, 7 Mint, 8 Caraway and

aniseed Seeds. 9 Coffee. 10 Chocolate Shells.
12 Hemp, flax and Straw. 13 the Canvass
of an old tent. 14 Old books. 15 the timber of an old house. 16 green wood confined in a close Cellar during the Summer months. 17 the green timbers of a new Ship. 18 the Stagnating Air of the hold of a Ship. 19 Bilge water. 20 Water that had been confined in hogsheads at Sea. 21. Stagnating rain water. 22 the Stagnating Air of close Cellars. 23 The malters which usually stagnate in the Gratters, Common Sewers, docks, and alleys of cities, and in the Sinks of kitchens. 24 Air emitted by agitating foul and Stagnating water 25 a Duck pond. 26 a Hogstye. 27 weeds cut down and exposed to heat and moisture near a house. The following simply animal

substances have been been known to
furnish Miasmatic exhalations
when in a state of putrefaction. 1 Human
bodies left unburied after a battle. 2 Locusts.
3 raw hides. 4 putrid beef. 5 putrid fish,
particularly a large whale. 6 putrid
oysters. —

I cannot dismiss this interesting
subject without calling upon you to
pause and reflect upon the facts that
have been detailed in discussing it. They
are important at all times, and in all
countries, but at no time, & in no coun=
=try at present more so, than in the United
States in which fevers from Miasma=
=atic exhalations are yearly spreading
distress and death ~~are~~ throughout every
part of our country. They are the

+ an exception from Dr Davidson in 4th Volume of Inquiries. ~~The same~~ The beginning of rainy seasons is however most likely in Guinea according to Dr Lind – Perhaps from the Rain being impregnated with miasmata after a long Series of Dry Weather, and in Guinea mentioned by Dr Lind.

more to be ~~done~~ studied, and treated, as the most dangerous form of them has been unhappily ~~denied force~~ denied to be of domestic origin, but imported from foreign countries. —

~~I have to~~ They are ~~two typical~~ of: ~~they are~~ destroyed ~~[illegible]~~ by nature, by means of heavy rains, + by black frosts, that is cold so intense as to produce ice, high winds, and ~~the~~ by a degree of heat so intense to to dry up their sources. The plague generally ceases in Egypt on the 17th of June because on that day the land overflowed by the Nile, becomes completely dry. For an account of the artificial modes of destroying these miasmata, or of obviating their morbid effects upon the body, I refer you to the 4th Volume of

any Inquiries. — ~~go to p: 72 N° 2.~~ +

II We come now in order to ~~treat~~ mention the ~~impregnation of the~~ effects of the air impregnated with ~~miasmata~~ Idio=miasmata, or miasmata derived from ~~morbid~~ living bodies. —

The morbid matter which produce diseases ~~is derived chiefly from perspiration~~ are deri==ved from the following causes.

1, The want of Cleanliness. This is a fruit==ful Source of ~~fat~~ disease. Linen garments have been supposed to accumulate and retain the morbid matter which is discharged from the pores, more than woolen or cotton, although the latter are supposed to retain it longest. The fevers ~~of~~ which prevailed in the American Army in the year 1775 were ~~occasioned~~ ~~chiefly to~~ derived in part from

v the army of the United States from
their being so much crowded were
the hot beds of a fever which destroyed
more than the sword during the
war which gave independence
to our Country. Even the tents
where crowded with men sometimes
generated this fever - hence it was
remarked - our soldiers were most
healthy when their marches, or
other duties compelled them to
sleep in the open air.

the rifle Shirt which was a part of the Uniforme of the Southern troops during that year of the revolutionary war of the United States.

2 Confinement in a Crowd. Jails, hospitals, Ships and even Schools often become the Sources of fevers from the Confinement and Concentration of the discharges from the pores of the human body. The military hospitals of

3 Low, rapid vegetable Aliment.

4 Putrid Animal food.

5 a Scanty quantity of wholsome Aliment. 6 Chronic ~~bilious~~ miasmatic fevers.

8 Dyspepsia of mind and

7 a sudden mixture with strangers

+ The same thing happens to cattle when suddenly herded together. Proves it. The flocks which have been driven produce the disease in those which have been in a quiescent state. The perspiration is changed in the former & thus induces the disease.

+ The disease when formed in any of the above ways is propagated by what I shall presently call the Contagion of excretion.

with each other.[25] This singular source of the origin of fevers was first pointed out by Dr Blane. He tells us that a fever of the typhus kind generally followed the mixture of the crews of different Ships, and even the admission of recruits into ~~the~~ a Ship. I have ~~ascribed to~~ considered this ~~in this~~ sudden mixture of troops from most of the States in the Union as another cause of the fever which prevailed with so much mortality in the American Army in the years 1775-46 +

From the enumeration of all those causes of fever from human miasmata it is easy to account for its greater frequency in the time of war, than

a Note

+ It has been remarked that Soldiers are more sickly when they sleep in tents than in the open Air during a Campaign. Hence it has been said an inactive Army is generally a sickly Army.

in peace, for war exposes to the want of Cleanliness, to confinement in hospitals, ~~pals~~ jails, prison ships, ~~or~~ besieged towns, and even in tents,+ to ~~scarcity~~ unwholsome ~~or~~ scanty Aliment, to chronic ~~bilious fevers~~ Rhinomatic fevers, to the conflux of strangers, and to great dispersion of mind. Famine & pestilence have ~~often followed~~ generally followed the footsteps of war, and hence we find Shakespeare with his usual eloquence describes them both as crouching for employment like a pair of hounds at the feet of Cæsar while he was girding on his sword. The connection between those two calamities is a natural one, for while war begets a ~~scarcity~~ scarcity of provisions by drawing men from agricultural pursuits, pestilence follows all the other causes that have been mentioned.

v induce disease when discharged from a healthy person, and afterwards suffered to stagnate until it undergoes a morbid change, I infer from the linen of persons in good health particularly of labourers producing fevers in washer wo=
=men. For this reason body linen when laid aside ~~should~~ for the washing tub ~~should particularly~~ should never be ~~to~~ thrust into what is called a cloaths bag or basket before it has been exposed for some time to the Air. Urine in a state of putrefaction is up liable to produce disease Sir John Pringle tells us than any any other excretion from the body.

The following circumstances deserve our attention in the history of human miasmata.

1 They are derived chiefly from ~~vitiated~~ perspirable matter vitiated in part in the body, but chiefly by the changes it undergoes by ~~the~~ stagnating upon the skin, or upon the ~~body &c~~ clothing of persons who generate it. The other excretions ~~per-spirations~~ in a putrid state will certainly produce disease, but they are a much less frequent source of it than the perspiration. That the perspiration may

2 They are generated more frequently & are more active in Winter than in Summer. Of this I saw many instances in ~~in~~ the American Army & military hospitals

chasing the revolutionary war. We seldom saw a typhus fever in warm weather, when it was safe and agreeable to keep the doors and windows of our hospitals open. I recollect a ~~very~~ malignant typhus fever broke out in the house of employment in this city (then a military hospital) in the ~~year~~ month of April 1777. In the beginning of the ensuing, we opened the doors and windows of the hospital, and the fever nearly disappeared. About the 20th of May ~~about~~ a week of unusually cool weather obliged us to shut our doors and windows, in consequence of which, the fever revived with fresh malignity, and carried off not only a great number

of Soldiers, but two senior Surgeons and ~~two~~ one mates who attended them, and assisted ~~with them~~ in a lighter degree, nearly every other Officer of the hospital. Dr Blane in his essay upon the means of preventing the diseases of Seamen mentions a fact which accords with the one I have related. He says the Ship fevers always disappeared in Voyages from England to the West Indies, the nearer they approached the Islands; but that it always increased the nearer they approached the cold and moist shores of great Britain, including from the West Indies. He ~~accounts~~ ascribes it very justly in the former case to the dispositions which Sailors and Soldiers have to be upon deck in warm latitudes which prevents the generation of morbid miasmata,